RCPGP Supply Chain Resilience:

Hidden Capacity and Vulnerability

September 2012

Core Findings

1. Supply chains are fundamental to modern life.

2. The restoration and/or redirection of supply chains is an essential aspect of disaster recovery; the **non-resilience of supply chains is a key characteristic of catastrophe**.

3. Supply chains are increasingly efficient, but there may be a growing **inverse relationship between efficiency and resilience.**

4. In disasters – and especially in catastrophic events – the **resilience of supply chains can be unintentionally impeded by public sector** behavior.

5. A shared understanding of supply chain characteristics and behavior is a crucial aspect of effective mitigation, response and recovery.

Core Assumptions

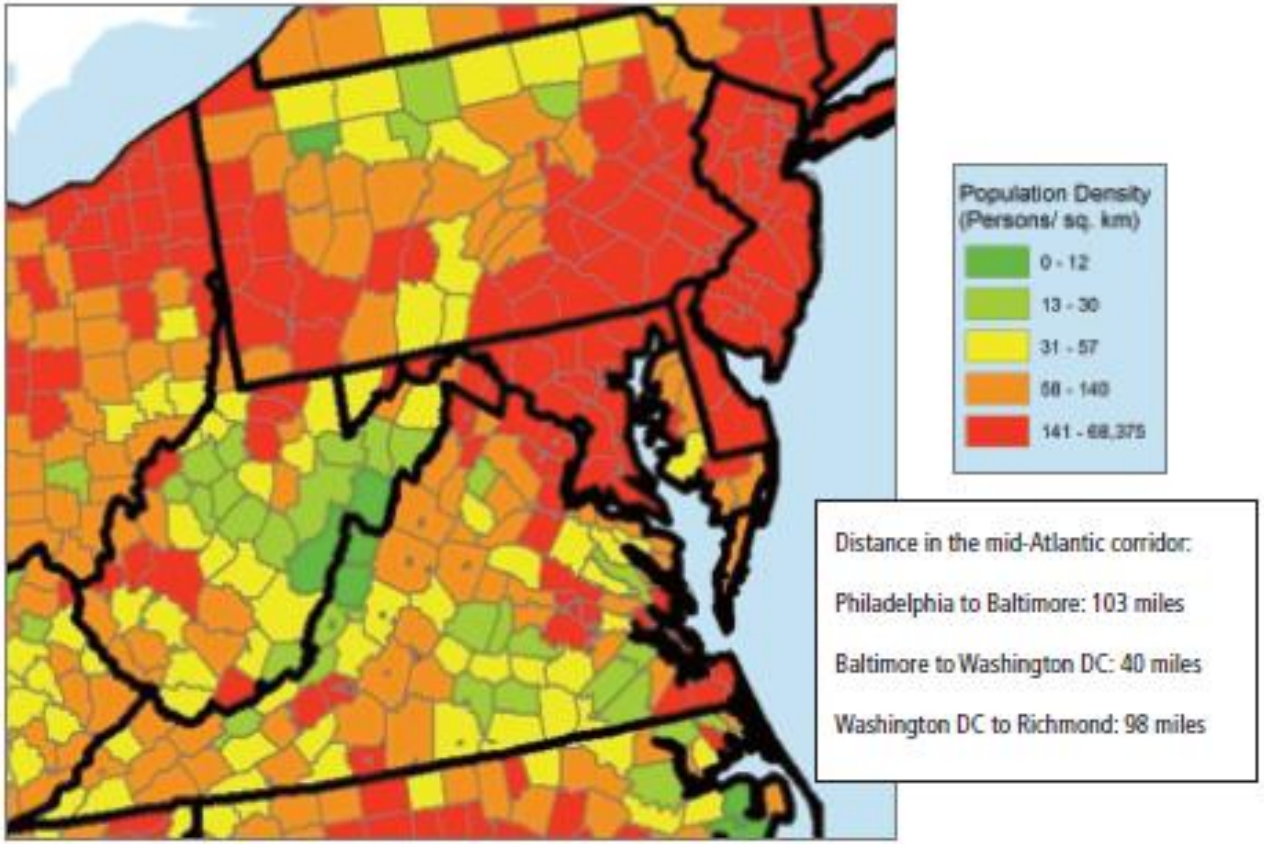
Many modern supply chains are more vulnerable to systemic disruption because there is…

a growing ***inverse relationship between efficiency and resilience;***

As a result of…

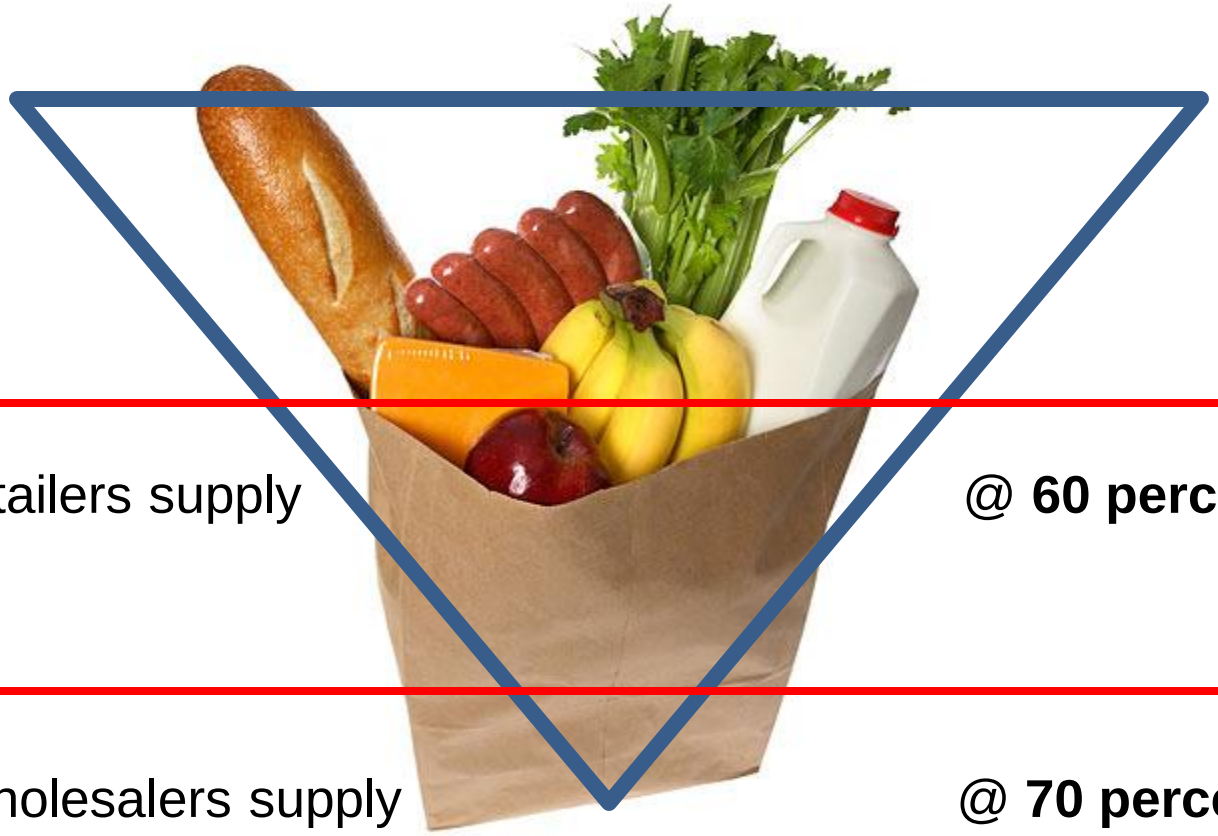
Increasing concentration, specialization and demand sensitivity of supply chain strategic capacity.

Concentration



Mid-Atlantic Population: 29 million

Concentration



5 retailers supply @ **60 percent**

2 wholesalers supply @ **70 percent**

Concentration

Major Grocery Distribution Centers

Concentration

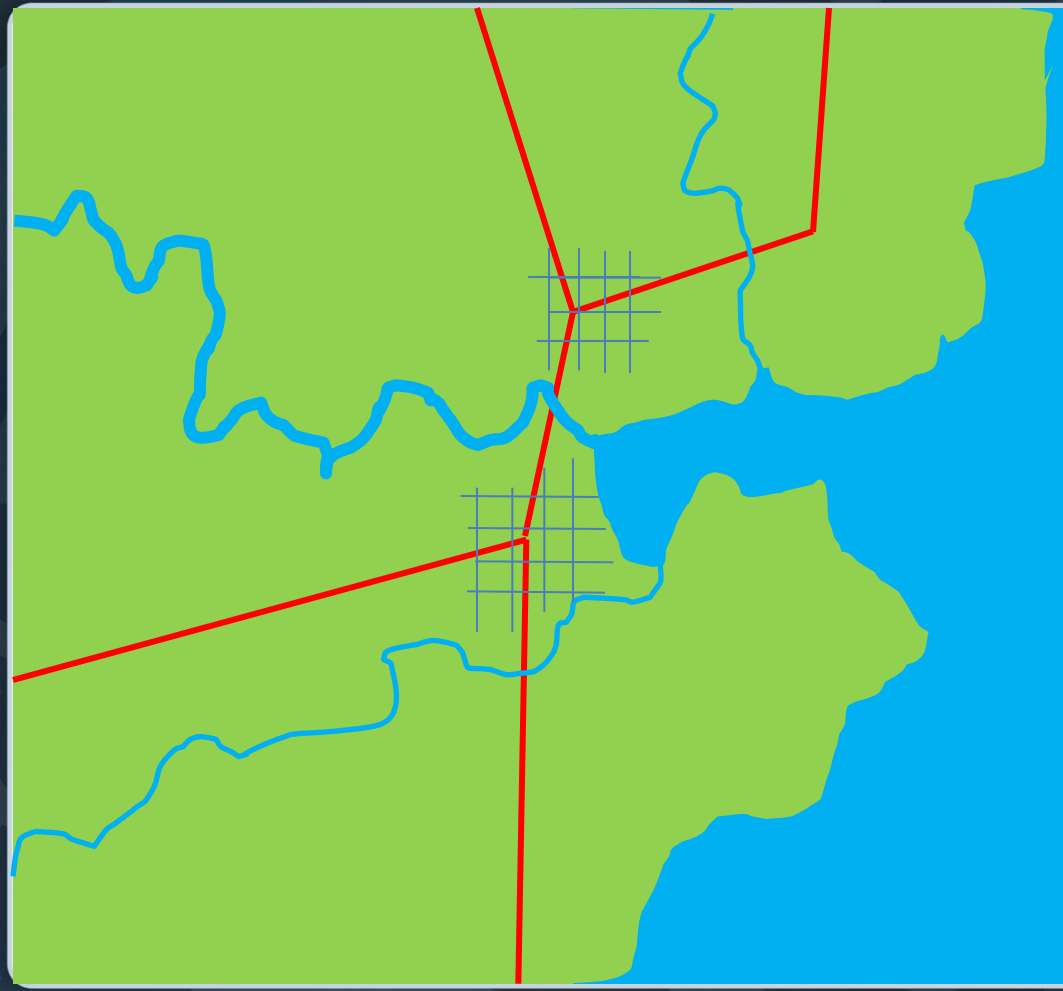
Institutional Food Supply Distribution Centers

Disaster v. Catastrophe

Disaster: Supply chains are disrupted in specific geographic areas, usually as a result of physical disruptions at point-of-distribution and inability of "pull signals" to be transmitted (typically because of local infrastructure failures). But the strategic capacity of supply chains remains intact and are able to be redirected based on new pull signals.

Catastrophe: Supply chain strategic capacity is seriously compromised by infrastructure failure across a broad region and inability or unwillingness of transportation resources to access population. Even if pull signals can be communicated, may be unable to meet relocated or spiking demand.

Supply Chain Abstraction

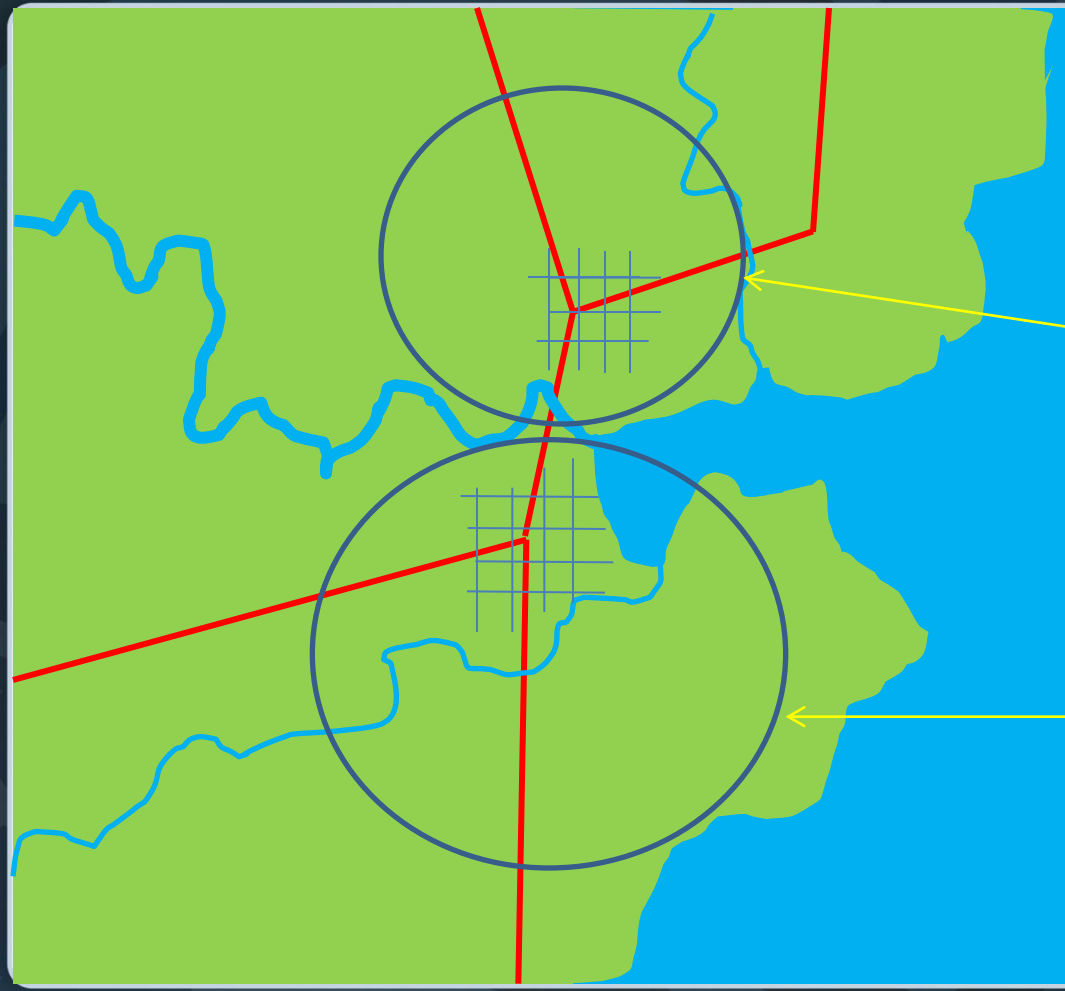


North City: 500,000

Bay City: 600,000

Metro Area: 2.8 million

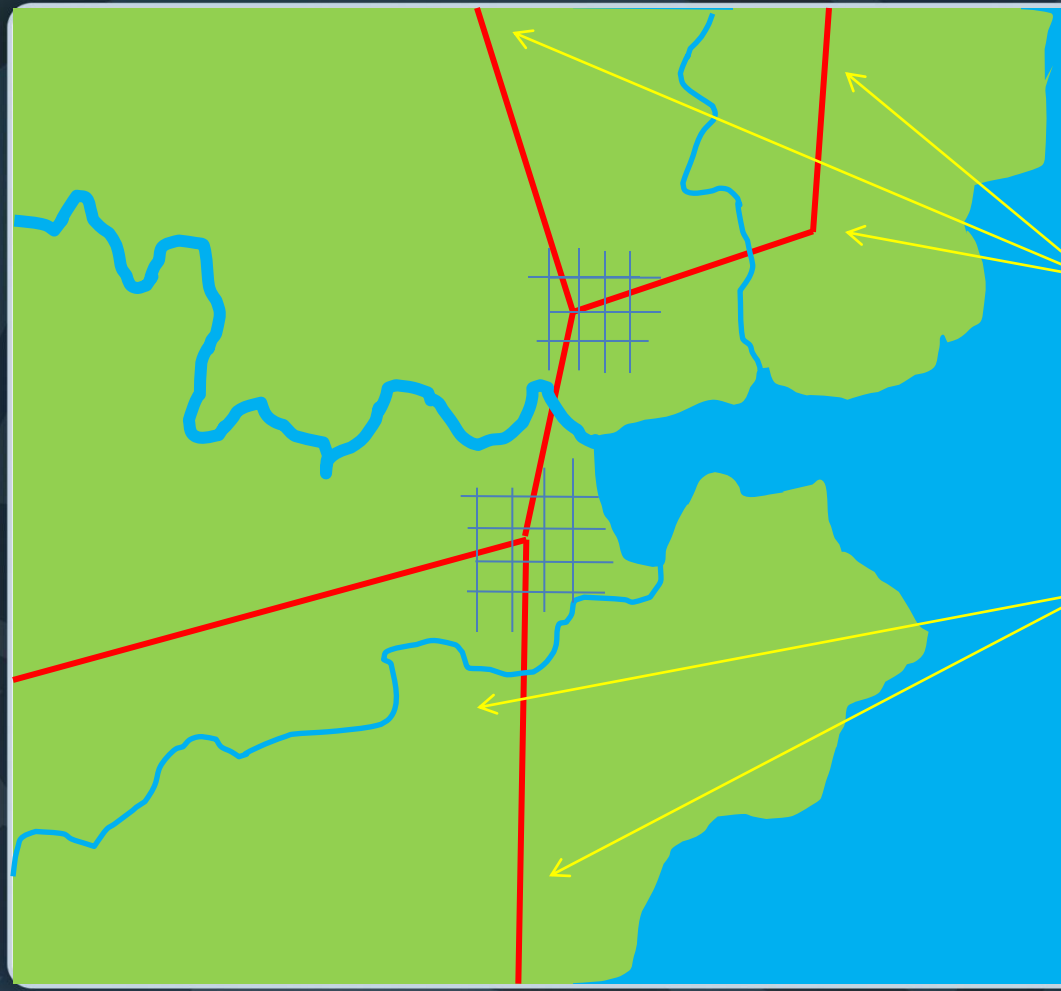
Supply Chain Abstraction



River North Water and Wastewater Authority: 900,000 consumers

Bay Water District: 1.5 million consumers

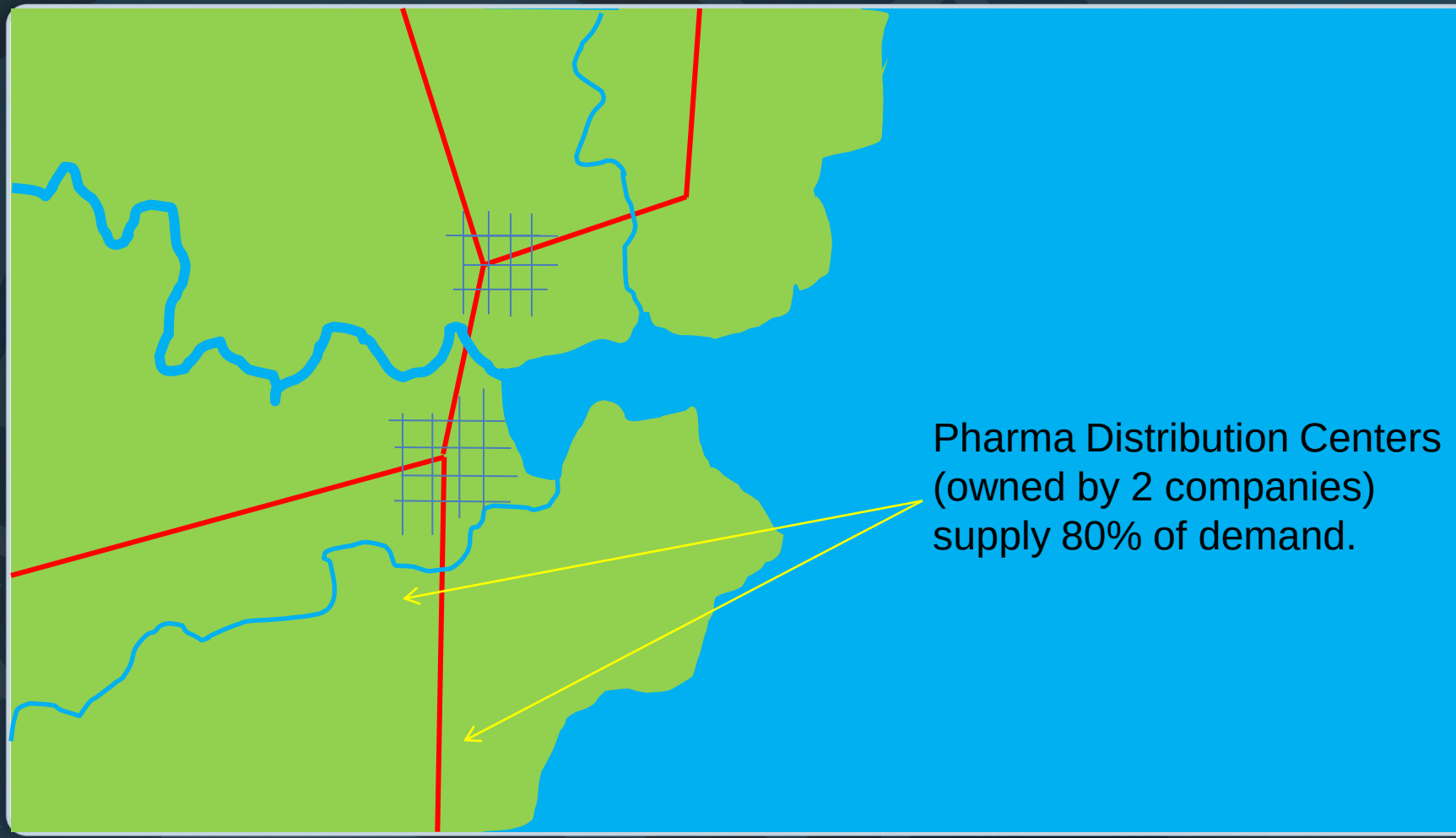
Supply Chain Abstraction



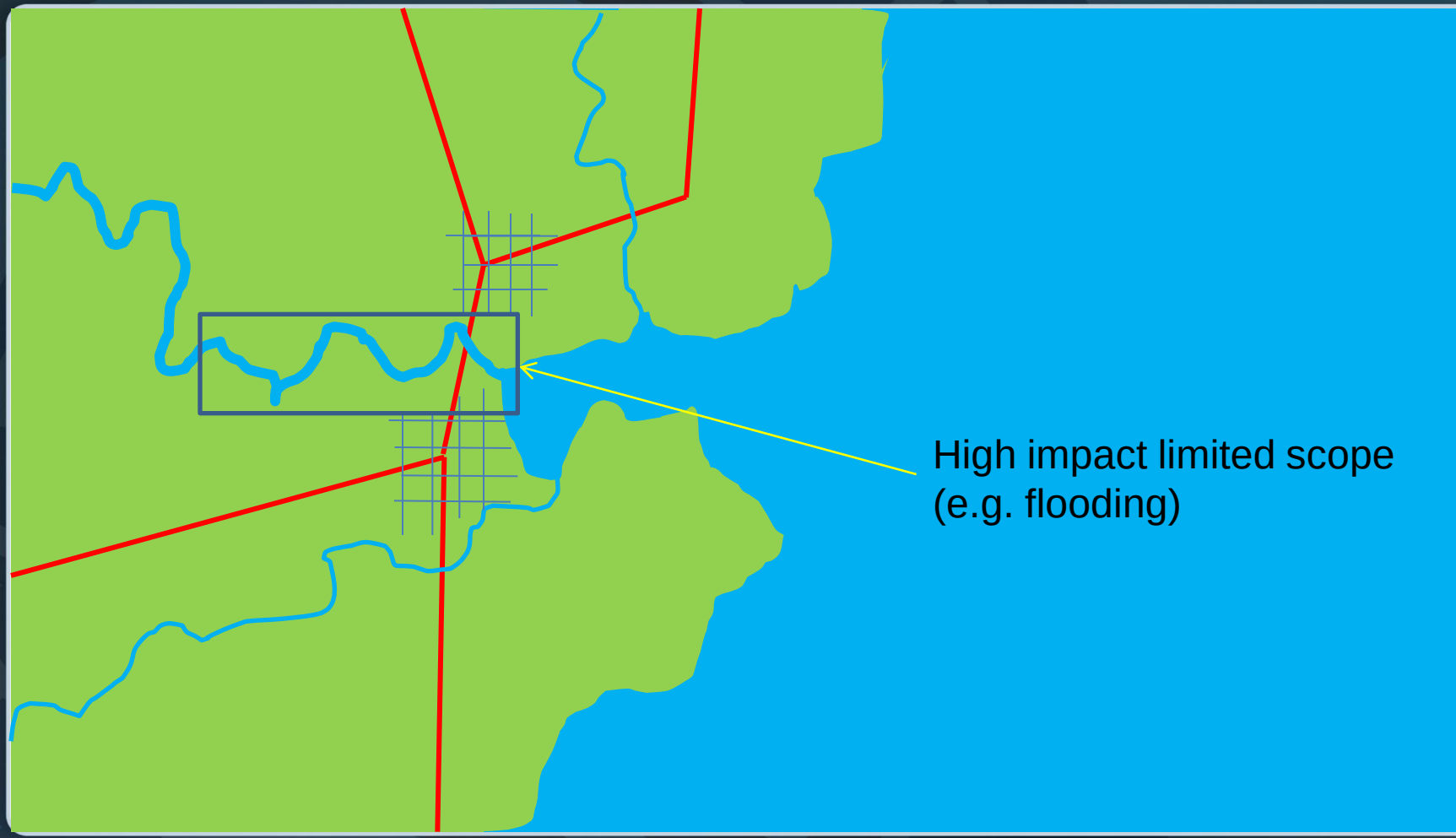
Food Distribution Centers (owned by 2 companies) supply 40% of demand.

Food Distribution Centers (owned by same company) supply 30% of demand

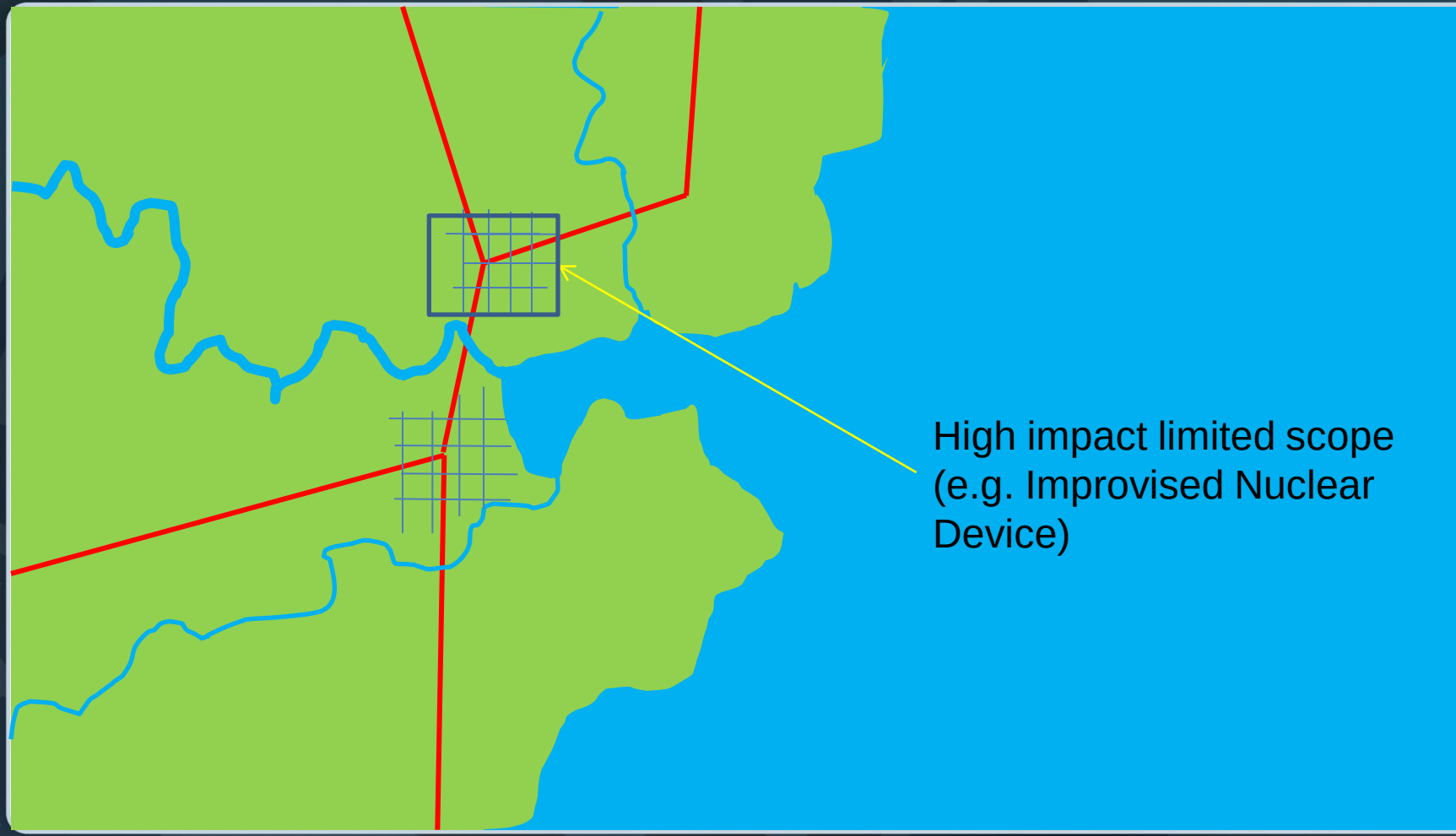
Supply Chain Abstraction



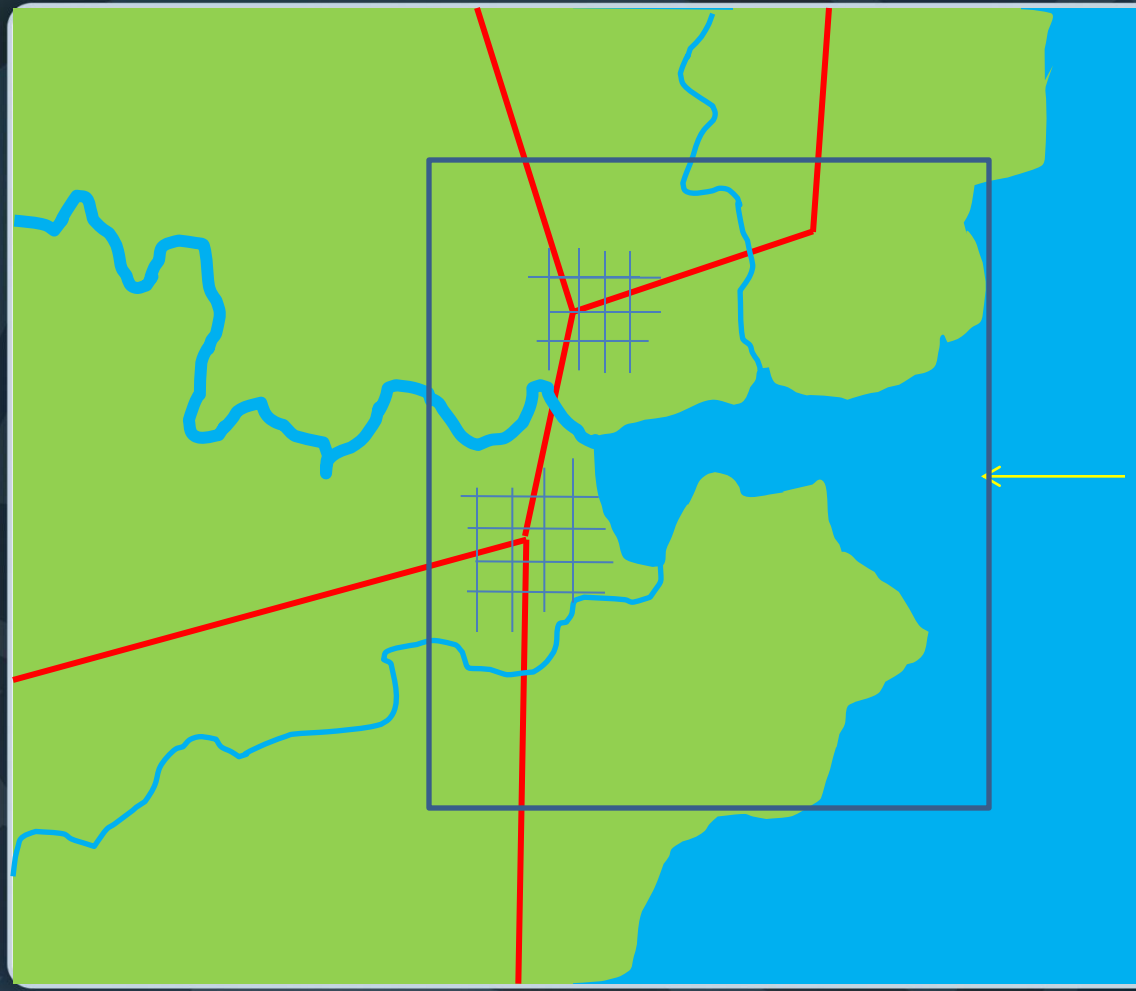
Supply Chain Abstraction



Supply Chain Abstraction



Supply Chain Abstraction



High impact expansive scope (e.g. Hurricane, Earthquake)

Supply Chain Resilience

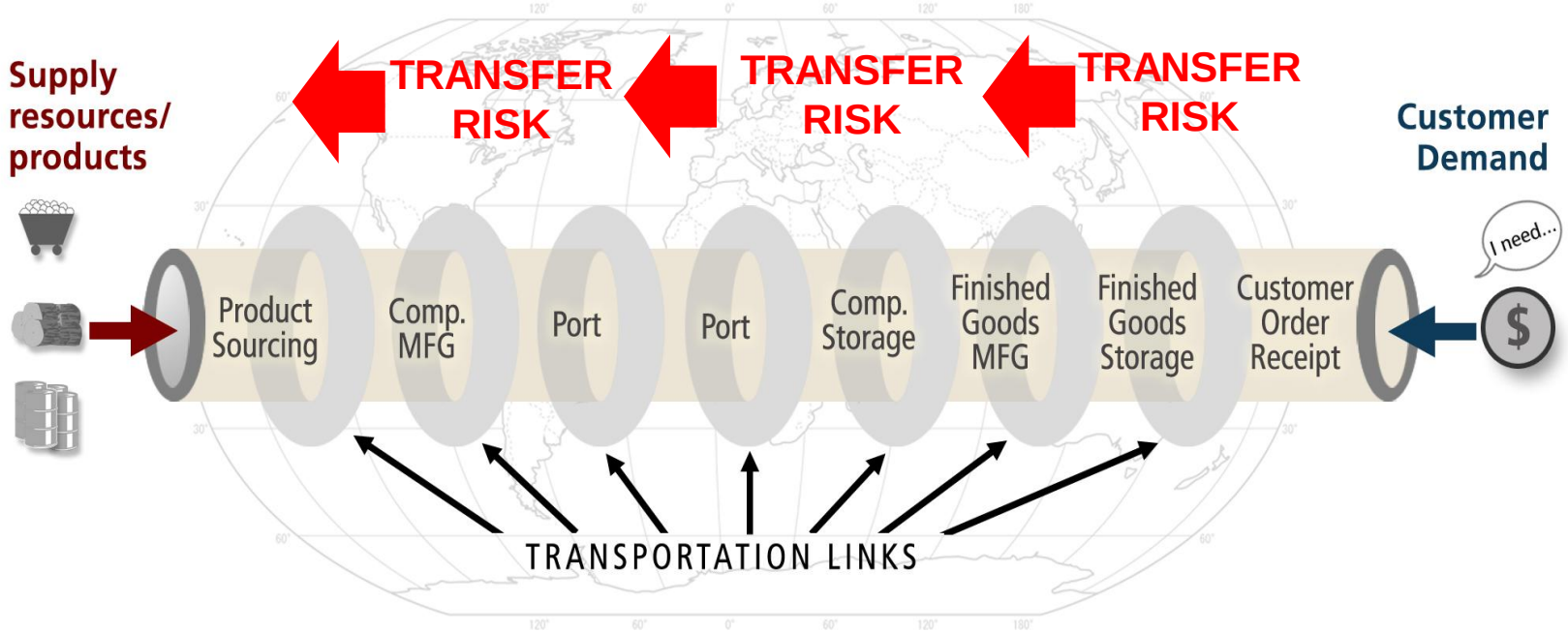
How do we enhance the resilience of the supply chain?

What are your core capacities? Water, food, pharmaceuticals, essential medical care, shelter, and related critical infrastructure.

How and where are your core capacities sourced, made, delivered, consumed, and returned? Where are nodes and links in the overall system?

What are the key relationships that enable the core capacities? How do these relationships work?

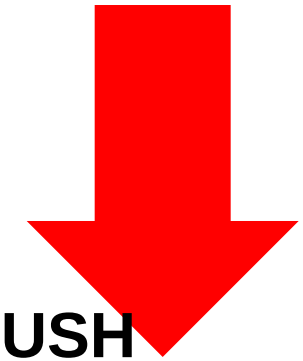
Specialization



Demand Sensitivity

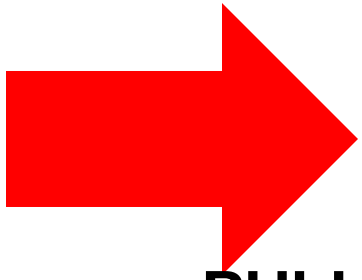
TRADITIONAL LOGISTICS: Supply responds to (even creates) demand

Supplier-facing
Inward-facing
Periphery-facing



PUSH

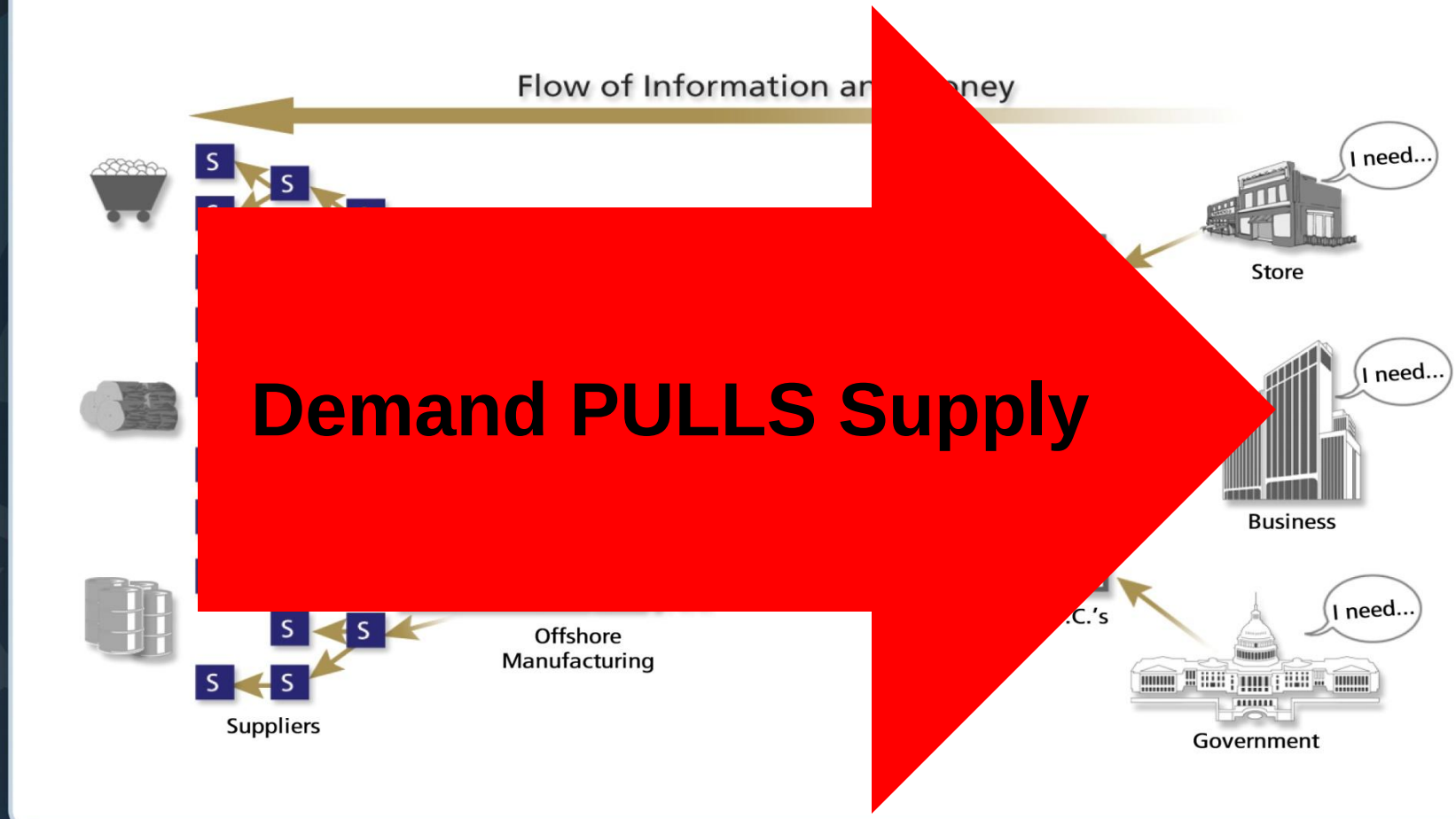
MODERN SUPPLY CHAIN: Demand creates supply



Customer-facing
Customer-serving

PULL

Demand Sensitivity



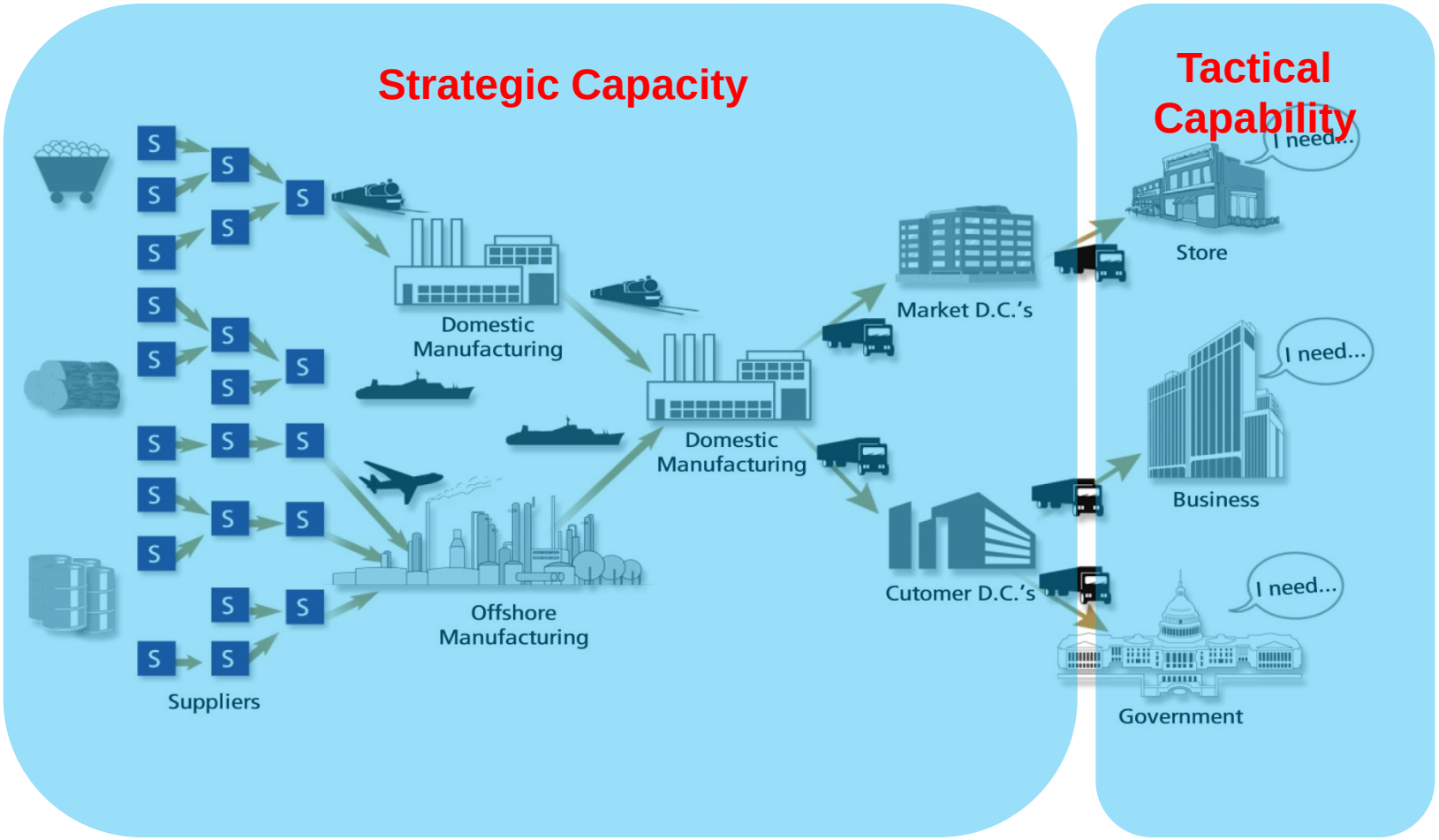
Strategic Capacity

According to the US Department of Transportation **each year** the Washington DC metropolitan area is the destination for over 1040 ktons of fresh fruits, vegetables, and related agricultural products, 390 ktons of meat and seafood, and **3340 ktons of frozen and processed fruits, vegetables, dairy products, and related foodstuffs**.

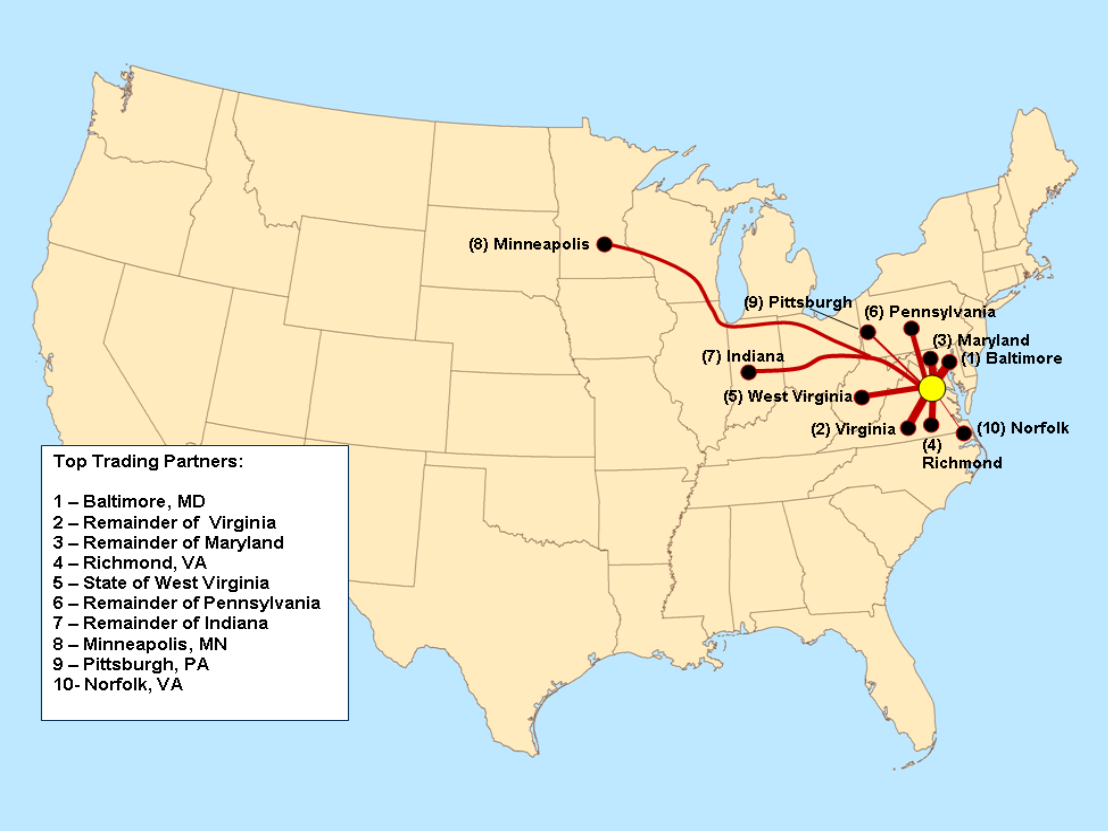
Comparison: **Between September 2001 and February 2004**, the Department of Defense Transportation Command moved **3072 ktons** to support operations in Iraq and Afghanistan.

In other words, each year the Washington DC area transports more frozen and processed foodstuffs, alone, than all the non-fuel and non-human cargo needed to prosecute the wars in Iraq and Afghanistan for over two years.

Strategic Capacity v. Tactical Capability

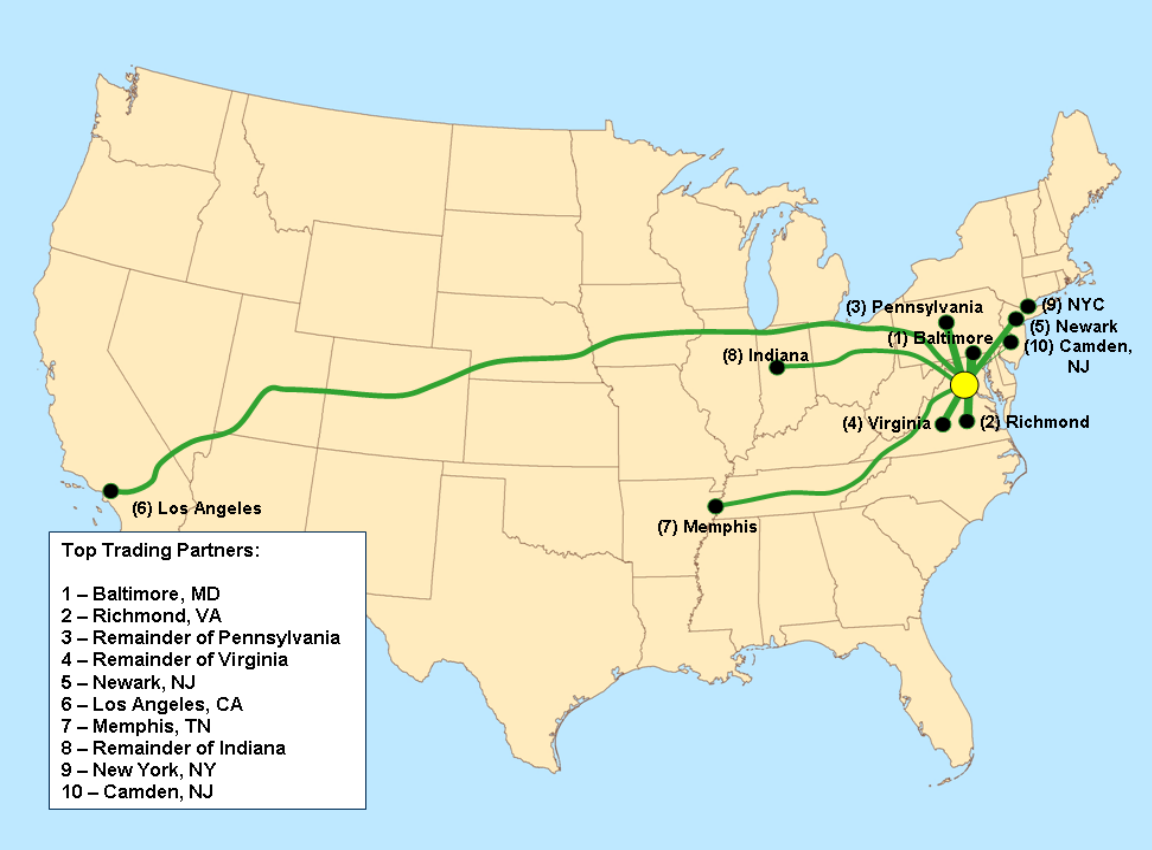


NCR Supply Chain Specifics



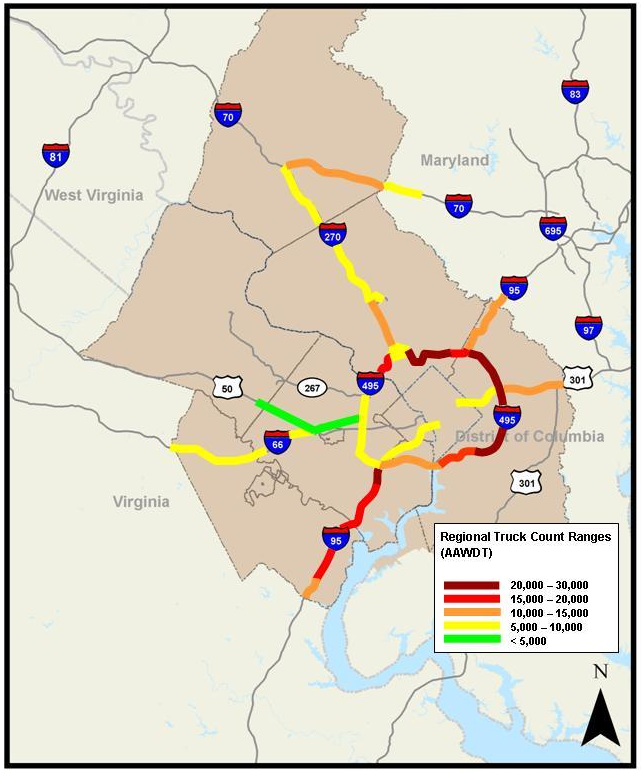
Top trading partners by weight

NCR Supply Chain Specifics



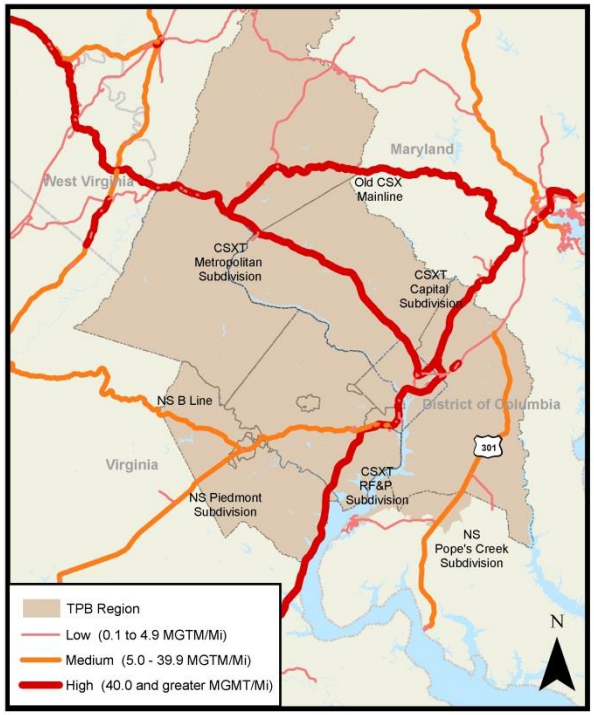
Top trading partners by value

NCR Supply Chain Specifics



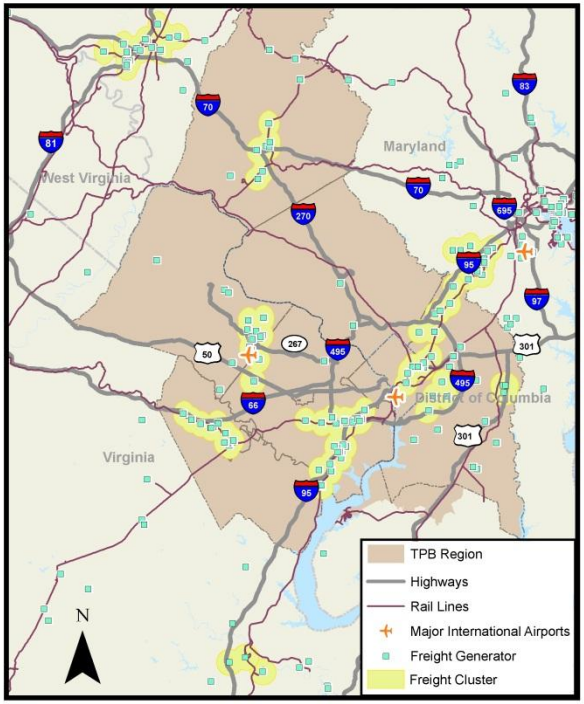
Trucking density

NCR Supply Chain Specifics



Rail density

NCR Supply Chain Specifics



Freight Clusters

Supply Chain Operating Reference model